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APPLICATION

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TITLE: METHOD, DEVICE AND SOFTWARE FOR ASSESSING URGENCY OF INCOMING COMMUNICATIONS

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METHOD, DEVICE AND SOFTWARE FOR ASSESSING URGENCY OF INCOMING COMMUNICATIONS

FIELD OF THE INVENTION

The present invention relates to communication processing and more particularly to a method, device and software for assessing urgency of incoming communications including calls, electronic messages and the like.

BACKGROUND OF THE INVENTION

In recent years, individuals have become overwhelmed by incoming electronic communications. Individuals appear to be always accessible. At work or at home they may be reached by telephone, voicemail, facsimile, or electronic mail; while travelling they may be reached by pager, cell phone or personal digital assistant. With all these ways of reaching an individual, it is no wonder that individuals are becoming overwhelmed by incoming communications. Undoubtedly this problem will become more pronounced as telecommunications networks expand, and as existing communications systems are integrated, so that facsimiles, voice mail, e-mail, and telephone calls are received and sent using integrated devices and systems.

As the volume of communications increases, many are not processed effectively. For example, many incoming live telephone calls are ignored and often forwarded to voice messaging systems, regardless of their importance. E-mail messages may be ignored.

Not surprisingly, communications devices have addressed ways of identifying the source of incoming communications, and ordering and processing these communications, based on their origin. For example, U.S. patent no. 5,329,578 discloses a personal communications system ("PCS") that processes incoming communications based on defined rules. This

system is effective in processing incoming communications from known originators, at defined times and may route calls based on the origin, urgency and time of call.

Existing e-mail protocols allow e-mail originators to flag messages as urgent. As well, U.S. Patent No. 6,057,841 describes an e-mail application that allows messages to be sorted based on user defined rules. These rules may cause the e-mail client to examine attributes of incoming e-mails and sort the e-mails based on these attributes. This technique is effective for messages whose attributes are known. However, when e-mail that does not fit a defined pattern is received, user-defined rule based handling may not be adequate.

In view of these e-mail protocols, e-mail originators have become accustomed to specifying message urgency. Other types of communications, such as telephone calls, typically do not allow originators to specify urgency of their outgoing communications. Even where systems do provide a feature allowing originators the option to specify urgency, such as some voice mail systems, the feature is typically not used as originators are often unfamiliar with it.

More significantly, existing approaches of assessing urgency rely on a static view of the priority of communications from originators, or on an originator's ability to prioritize a communication for a recipient.

Accordingly, improved methods, software and devices for processing communications to facilitate prioritizing of such communications are desirable.

SUMMARY OF THE INVENTION

In accordance with the present invention, the likely urgency of an incoming communication from an originator to a recipient may be assessed by

maintaining a log of past incoming communications for the recipient, and upon receipt of the incoming communication, examining the log to assess the urgency, taking into account the pattern of prior communications from the originator.

In accordance with an aspect of the present invention, a method of assessing the urgency of an incoming communication from an originator to a recipient, implemented by a computer, includes maintaining a log of past incoming communications for the recipient, and upon receipt of the incoming communication, examining the log and based on previous communications from the originator, assessing the urgency.

In accordance with another aspect of the present invention, a computing device includes a processor, and computer readable memory in communication with the processor and storing application software adapting the processor, upon receipt of an incoming communication from an originator to a user to examine a log reflecting past incoming communications for the user to assess an urgency of the incoming communication, based on past communications from the originator.

In accordance with yet another aspect of the present invention, a computer readable medium stores processor executable instructions, that when loaded at a computing device having access to a log of past incoming communications for a user, adapt the computing device to examine the log to assess an urgency of a current incoming communication from an originator to the user, based on past incoming communications from the originator.

Other aspects and features of the present invention will become apparent to those of ordinary skill in the art upon review of the following description of specific embodiments of the invention in conjunction with the accompanying figures.

BRIEF DESCRIPTION OF THE DRAWINGS

In the figures which illustrate by way of example only, embodiments of this invention:

FIG. 1 illustrates a messaging server exemplary of an embodiment of the present invention, in communication with a data and telephone network;

FIG. 2 schematically illustrates the architecture of the exemplary device of **FIG. 1**;

FIG. 3 illustrates the organization of memory of the device of **FIG. 1**;

FIG. 4 illustrates an exemplary organization of a log reflecting received incoming communications for a user of the server of **FIG. 1**; and

FIG. 5 illustrates exemplary steps performed by the server of **FIG. 1** upon receipt of an incoming communication.

DETAILED DESCRIPTION

FIG. 1 illustrates an incoming messaging server **10**, exemplary of an embodiment of the present invention. Messaging server **10** is in communication with a data network **12**, and telephone network **14**. As illustrated, messaging server **10** may be directly interconnected with network **12** and indirectly to telephone network **14** through private branch exchange **16** ("PBX") telephone switch. Messaging server **10** may, for example, be a CallPilot communications server available from Nortel Networks, modified to function in a manner exemplary of the present invention. Messaging server **10** is in communication with a plurality of communications devices associated with an individual end-user. Example messaging devices may include illustrated computing device **20**; mobile phone **22**; personal digital assistant

("PDA") **24**; and telephone **18**. A conventional printer **26** is also in communication with server **10**.

Example messaging server **10** is adapted to provide unified messaging to a plurality of users associated with server **10**. Messaging server **10** may, for example, process incoming communications to a commonly linked group of individuals, such as for example, workers within an office. Typically, a single user will be associated with an e-mail address, for receipt of e-mails at a computing device such as device **20**; a telephone number for receipt of calls at a phone such as telephone **18**; and a telephone number for receipt of facsimiles at device **20**. Optionally, server **10** could be associated with other communications devices associated with a user. For example, calls to portable devices, such as phone **22** and PDA **24** could be routed through PBX **16** and/or server **10**.

Example data network **12** is preferably a packet switched communications network that allows interconnected computing devices to exchange data using known packet based protocols, such as the internet protocol ("IP"), as detailed in RFC **791**. Network **12** may for example be the public internet, a local area network, or a private intranet, that is preferably in communication with other data networks, and ultimately the public internet.

Telephone network **14** is preferably the public switched telephone network (the "PSTN"). PDA **24** and portable telephone **22** are preferably in communication with telephone network **14** and data network **12**, by way of suitable wireless communications networks (not illustrated) and gateways (also not illustrated) coupling such networks to telephone network **14** and data network **12**.

A simplified preferred architecture of server **10** is schematically illustrated in **FIG. 2**. In the illustrated embodiment, server **10** is a conventional computing device. Server **10** could, for example, be an Intel x86 based

computer acting as a Microsoft Windows NT server, or another personal computer, or the like.

Server **10** includes a processor **30**, in communication with computer readable memory **32**; data network interface **36**; input/output interface **34**; telephone network interface **42**; and video adapter **38**. As well, server **10** may optionally include a display **44** interconnected with adapter **38**; input/output devices, such as a keyboard **48** and disk drive **40** and a mouse (not shown) or the like. Processor **30** is typically a conventional central processing unit, and may for example be a microprocessor in the INTEL x86 family. Of course, processor **30** could be any other suitable processor known to those skilled in the art. Computer storage memory **32** includes a suitable combination of random access memory, read-only-memory, and disk storage memory used by server **10** to store and execute software programs adapting server **10** to exchange communications using network **12**, and manage received communications in manners exemplary of the present invention. Drive **40** is capable of reading and writing data to or from a computer readable medium **46** used to store software and data to be loaded into memory **32**. Computer readable medium **38** may be a CD-ROM, diskette, tape, ROM-Cartridge or the like. Network interface **36** is any interface suitable to physically link server **10** to network **12**. Interface **36** may, for example, be an Ethernet, ATM, ISDN interface or modem that may be used to pass data from and to data network **12** or another suitable communications network. Telephone interface **42** may be a suitable ISDN/DS1 interface, including voice processor such, as for example, the telephone interface integrated into existing CallPilot products, or similar interfaces available from Dialogic of Parsippany, NJ. As such, interface **42** may be capable of receiving and digitzing voice signals from PBX **16** and thus telephone network **14**. Telephone interface **42** may also act as a facsimile modem, to receive facsimile transmissions from telephone network **14**, and form suitable TIFF files representative of transmitted facsimiles.

An exemplary organization of computer storage memory **32** of server **10** is illustrated in **FIG. 3**. As illustrated, stored within memory **32** are computer software programs and data that are used by processor **30** to permit server **10** to be operable as network communication capable device. As illustrated, memory **32** stores operating system software **50**; application software **52**; and data within data portion **66**. Operating system software **50** may, for example, be Microsoft Windows NT Workstation operating system software, UNIX operating system software, or the like. Application software **52** includes network interface software **54** which typically includes an internet protocol stack allowing communication of server **10** and thus operating system **50** with network **12** (**FIG. 1**), through physical network interface **36** (**FIG. 2**). Application software **52** further include a electronic mail server application/library **60**; a voicemail messaging application **56**; and a facsimile server application **58**; and a communication monitoring application **62**, exemplary of an embodiment of the present invention. Other applications **64** used by users of data network **12** may also be stored within memory **32**. Data within data portion **66** may be stored, processed and retrieved by processor **30** under control of applications **52** or operating system **50**.

As understood by those skilled in the art, network interface software **54** may include internet stack that supports the basic internet protocol as detailed in RFC 791, TCP/IP and other internet protocols. Interface software **54** enables server **10** to exchange data over network **12** using known IP protocols, including messages that may be in the form of e-mail messages in the known simple mail transfer protocol ("SMTP"). Suitable internet protocol stacks are readily available for various platforms, and may form part of operating system **50**.

Voicemail messaging application **56** adapts messaging server **10** to act as a voice mail server, allowing server **10** to receive incoming calls for subscribers from telephone network **14**, by way of telephone network interface **42**. Voicemail application **56** is conventional, and stores digitized voice

messages in memory **32** in a conventional fashion. Stored messages may be incoming messages received by way of interface **42**, or outgoing messages presented to incoming callers from telephone network **14** and presented through interface **42**. Voicemail application **56**, may thus allow server **10** to act as a voice message server for associated users of server **10**. Preferably server **10** provides voice mail services to users of PBX **16**, in the event calls are unanswered. Preferably, each stored message includes an indicator of the originator of the message. The indicator could be derived from calling line identification (CLID) information associated with a call leaving the message.

Facsimile server application **48** similarly adapts server **10** to receive facsimile messages from telephone network **14** for a particular user, also preferably by way of telephone network interface **42**. Again, facsimile server application **48** may be a conventional facsimile application such that currently forming part of the CallPilot product. Typically, facsimiles are received in TIFF format, and may be stored within data portion **66** of memory **32** at server **10** and optionally printed at printer **26**, or delivered to an end user as an e-mail message through e-mail server application **60**, described below. Preferably, information reflecting the origin of a facsimile message as well as its destination are stored within data portion **66** memory **32** and associated with an incoming facsimile message. A facsimile's destination may be assessed based on the called facsimile telephone number; using optical character recognition; or in other ways understood by those of ordinary skill.

Additionally, e-mail server application **60** is a conventional e-mail messaging server application. It may for example, be a post-office-protocol, or IMAP compliant e-mail application, capable of receiving, storing and processing incoming e-mails received by way of data network **12** directed for users of server **10**. Typically, received messages will comply with the SMTP. Messages may be stored for eventual retrieval by or forwarding to a user, at device **20**, mobile phone **22**, or PDA **24**. Again, received e-mails including source and destination e-mail addresses are stored within memory **32**.

Optionally, e-mail server application **60** may also adapt server **10** to act as an SMTP server, capable of receiving outgoing e-mail messages from computing devices interconnected with network **12** (such as computing device **20**) and dispatching these to others using the SMTP.

Exemplary communication monitoring application **62** receives data from voicemail application **56**; facsimile server application **58**; and e-mail application **60**, and tracks and processes incoming communications in manners exemplary of the present invention. Application **62** may accomplish this by monitoring the contents of data portion **66** of memory **32**, or alternatively by receiving indicators of incoming communications from applications **56**, **58** and **60**. Optionally, application **62** may also receive messages indicative of outgoing communications, such as e-mails or facsimiles, dispatched by users using applications **56**, **58** or **60**.

These messages may similarly be logged as records within log **100**, as illustrated in **FIG. 4**. Log **100** is preferably associated with a single user of server **10**, and may log communications to and from this user. As such, server **10** preferably stores multiple such logs, one for each user. As illustrated, each entry within log **100** preferably includes an identifier of the originator, preferably by e-mail address or calling line identification, as well as an indicator of the type of communication, time, and other information, such as message duration. Records are preferably added to log **100** in order of receipt or origination of a communication. Records within log **100** may be stored as ASCII text, and fields within records may be delimited using standard delimiters.

Exemplary communication monitoring application **62** further receives messages from PBX **16**, indicative of incoming telephone calls to a users of server **10**. Optionally, application **62** further receives messages indicative of outgoing calls from such user. Preferably, upon receipt of an indicator of an incoming call, answered or not, software at PBX will generate a message

reflective of the incoming call and whether it has been answered to be passed to application **62** for storage in log **100**. Again, each message may include the calling number; the communication type; start time; and duration. At the conclusion of a call, a record for storage in log **100** may be formed. This record may include an identifier of the caller, whether or not the call was answered; the duration; and an indicator of whether the call was answered or forwarded to another number (such as the number associated with the telephone interface associated with the voice mail software at server **10**). Similarly, for outgoing calls, records representative of these calls may be stored within log **100**, including suitable identifiers of the communications as outgoing calls. In the event server **10** is interconnected directly to telephone networks a conventional telephony switch forming part of network **14**, modified to function in manners exemplary of the present invention, could provide messages indicative of incoming and outgoing calls to server **10**.

In operation, communications originators (not illustrated) originate communications intended for an example recipient associated with server **10**, such as a user of computing device **20** and telephone **18**. Communications may take the form of real-time communications such as telephone calls, possibly resulting in voice-mail messages stored at server **10**; e-mails or facsimiles stored at sever **10**. Initially, all incoming communications are treated alike, or in accordance with handling rules, such as, for example, those described in US Patent No. 5,329,578 and known to those of ordinary skill. As will become apparent, records reflecting incoming communications are stored within log **100**, as detailed below.

As well, in a manner exemplary of an embodiment of the present invention, and upon receipt of an incoming communication, monitoring application **62** checks log **100** to assess a perceived urgency of the incoming communication based on information stored within log **100**. Exemplary steps **S500** used to assess this urgency are illustrated in **FIG. 5**. As illustrated, upon receipt of an indicator of an incoming communication, application **62**

receives a message indicative of the incoming communication in step **S502**, including the communication type and originator. Application **62** may calculate a value representative of this perceived urgency. As such, a variable storing a numerical value of communication urgency is reset in step **S504**. Next, application **62** compares the indicator of the incoming communication to records within log **100** to count the number of times the originator has attempted to contact the subject recipient in a given interval (e.g. a fixed time interval since the originator last communicated with the recipient) in steps **S506-S508**. For example, application **62** may assess the number of times the originator has attempted to contact the recipient in the last day, week or other suitable interval. Optionally application **62** may query a directory (not illustrated) to cross reference identifiers of originators of incoming communications, to assess which identifiers are common to, or associated with a single originator. For example, application **62** may assess if an e-mail address, telephone number, and facsimile identifier actually identify the same originator.

While querying the suggested directory, application **62** could further optionally assess if multiple individual originators are associated with each other or with the same organization. Using this option, the multiple communications from the multiple individual originators could be treated as communications from a single organizational originator, for the purposes of assessing priority in manners exemplary of the present invention. In this way, communications from any of the multiple associated individual originators would be indicative of a communication from the organization. Thus, as should now be appreciated, an originator, as used herein, may include multiple associated originators.

In any event, the number of times an originator has previously attempted to contact the recipient may be calculated by determining which records within log **100** are within a desired interval and have an originating address equal to (or equivalent to) that associated with the currently incoming

communication. The desired interval may begin on a chosen date or time and optionally after a last communication has been received (e.g. an e-mail read, a voicemail heard, or a real-time communication with the originator initiated or answered by the recipient). The value of the number of times the particular originator may be added to the numerical urgency total in step **S508**.

Additional indicators of urgency that may be drawn from the contents of log **100** may be added to this value. For example, application **62** in step **S510** locates the record within log **100** reflecting the last incoming communication by the originator of the current communication, and as such may assess the time lapsed since the last contact attempt. The shorter the time, the more the value of urgency may be adjusted. Thus, if the originator attempted to contact the recipient in the past hour as determined in step **S512**, the value may be increased by an additional nominal value (such as 2, for example), in step **S514**. Additionally, application **62** may examine log **100** to assess whether the frequency of contact is increasing, by comparing the duration between the last three communications as exemplified in steps **S516-S520**. If so, the calculated value of urgency may be increased by another nominal value, as exemplified in step **S520**. Of course, other indicators of urgency could be used to assess the overall urgency of an incoming communication.

If the total calculated value of urgency is greater than a pre-set value, which may be set by the user, application **62** may treat the communication as having taken on a sufficient urgency in the mind of the originator (as indicated by the frequency and interval of the of new communications by the originator). For example, if at the conclusion of steps **S500**, application **62** has associated an urgency of 6 or more with a communication, it may be treated as urgent.

Once application **62** assesses that an incoming communication has a certain urgency, it may mark the communication as urgent, and process it accordingly. For example, server **10** may dispatch a notification of the incoming to PDA **24** or portable phone **22**, or another device. In the event the

incoming communication is an e-mail or fax, and its assessed urgency exceeds the pre-set threshold, the entire communication may be forwarded to the PDA **24**. Similarly, an indicator of a waiting voice mail message may be forwarded to PDA **24** or phone **22**. Similarly, the communication may be modified to include an indicator of urgency. The indicator of urgency might be a binary value signifying urgency, or a numerical value within a range allowing multiple levels of urgency, depending on the assessed urgency. For example, the header of an incoming e-mail may be modified; an urgency field in the e-mail could be modified; a cover page to a facsimile may be created or modified; or an urgency flag or value may be associated with an incoming voicemail before storage at server **10**.

Alternatively, once server **10** detects the perceived urgency, any real time communication could be forwarded by server **10**, in manners described in US Patent No. 5,329,578 to an alternative destination. The alternative destination could be a telephone device in communication with communication telephone network **14**, or a data network capable device in communication data network **12**.

As will also be appreciated, in the event that an incoming communication includes its own pre-set identifier of urgency, (e.g. an urgency flag associated with an e-mail, or the like), the communication may optionally be processed using existing processing rules instead of steps **S500**.

Although the invention has been described in the context of a messaging server **10** capable of processing incoming phone calls, e-mail messages, and facsimile message, a person of ordinary skill will readily appreciate that the invention could be used to process all types of communications of numerous types from diverse communications networks. So for example, server **10** could easily be adapted to process incoming real-time data network communications, such as voice over IP calls received by way of data network **12**; multimedia communications received, for example a

video call, by way of network **12**; wireless network communications received from a suitable gateway or directly; as well as other incoming communications readily appreciated by a person of ordinary skill. Similarly, while messaging server **10** has been illustrated as a separate device, a person of ordinary skill will readily appreciate that the functionality of server **10** could be integrated with other communication equipment. For example, components of server **10** could be integrated into a telephony switch, or other data network or PSTN node.

Similarly, while the organization of hardware, software functional blocks, and data have been illustrated as clearly delineated, a person skilled in the art will appreciate that the delineation between blocks is somewhat arbitrary. Numerous other arrangements of hardware, software blocks and data are possible. For example communications records for all users could be stored in a single log. A log, such as log **100** could be stored as a database or otherwise. The functionality of server **10** could for example be distributed across numerous communicating computing devices. So for example, application **62**, exemplary of an embodiment of the present invention could be stored and executing at a first computing device, in communication with other computing devices capable of receiving e-mails, facsimiles, voice mail messages, and the like.

Of course, the above described embodiments, are intended to be illustrative only and in no way limiting. The described embodiments of carrying out the invention, are susceptible to many modifications of form, arrangement of parts, details and order of operation. The invention, rather, is intended to encompass all such modifications within its scope, as defined by the claims.